ten months after the cyanide had been put into it. FERNANDO SANFORD

QUOTATIONS

THE ORGANIZATION OF SCIENCE

JUST before the beginning of the war much fruitful discussion was going on in the columns of *Nature*, the *Morning Post* and *Science Progress* on the subject of the encouragement of science; and those who are interested in the theme should read Dr. R. S. Woodward's address on the needs of research, delivered on the occasion of the dedication of the Marine Biological Laboratory, Woods Hole, Massachusetts (SCIENCE, August 14, 1914).

Dr. Woodward begins by exposing some of the popular fallacies regarding research—that it "is akin to necromancy"; and that "the more remarkable results of research are produced not by the better balanced minds, but by aberrant types of mind popularly designated by that word of ghostly, if not ghastly, implications, namely 'genius.'" He has also exposed the absurdity that research institutions should busy themselves in soliciting suggestions from the amateur public outside, that is "in casting drag-nets in the wide world of thought, or in dredging, as biologists would say, with the expectation that out of the vast slimy miscellanies thus collected there will be found by the aid of a corps of patient examiners some precious sediments of truth." He thinks that "important advances in knowledge are far more likely to issue from the expert than from the inexpert in research."

Dr. Woodward traverses the idea "that research is a harmless and a fruitless diversion in the business of education"; and gives some figures as to the comparative expenditure of the United States on education and research respectively.

> The number of higher, or degree-giving, establishments in the United States is now upwards of six hundred; the aggregate annual income of these is upwards of one hundred millions of dollars; and the number of officials connected with them is upwards of thirty thousand. On the other hand, the number of independent research organizations in the United States is less than half a dozen; their aggregate annual income is less than two million dollars; and the number of officials primarily connected with them is less than five hundred.

Something very like this holds also in Britain, and indeed throughout the world. Men can not be made to understand, even with the astonishing results which investigation has placed before us, the supreme importance of such effort. They still conceive that it is more important to teach boys how to do things than actually to get the things done.

The war now raging will at least demonstrate one thing to humanity—that in war, at least, the scientific attitude, the careful investigation of details, the preliminary preparation, and the well-thought-out procedure bring success, where the absence of these leads only to disaster. So also in everything. After all, the necessity for research is the most evident of all propositions. But the question (which I hope will receive still more careful attention when the war is over) is, What can the state do to make the machinery of investigation the most efficient possible? The mere citing of popular misconceptions is not enough; we need to have specific programs. The October number of *Science Progress* contains one such program, which I hope will receive the attention of men of science. Whether all the items are accepted or not remains to be seen; but until the discussion is earnestly undertaken, we can scarcely hope that the state will give more help than it has done hitherto. Dr. Woodward puts his finger upon a weak point in men of science as a body. "We are," he says, "as a class of too recent monastic descent to fit comfortably in our present social environment." That is just it. We are not strong enough in making our demands heard; and, in my opinion, this is not a virtue, but a neglect of duty.—Sir Ronald Ross in *Nature*.

SCIENTIFIC BOOKS

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